

## WEST Search History





DATE: Tuesday, December 07, 2004

Hide?	Set Name	Query	Hit Count
	<i>DB=PGPB,USPT,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=ADJ</i>		
<input type="checkbox"/>	L15	L10 and complex	15
<input type="checkbox"/>	L14	L13 and complex	1
<input type="checkbox"/>	L13	L12 and subliming	1
<input type="checkbox"/>	L12	L10 and (chamber)	3
<input type="checkbox"/>	L11	L10 and (treatment chamber)	1
<input type="checkbox"/>	L10	L9 and copper	19
<input type="checkbox"/>	L9	silylolefin ligand	20
<input type="checkbox"/>	L8	L7 and \$silane	17
<input type="checkbox"/>	L7	L5 and ligand	46
<input type="checkbox"/>	L6	L5 and silylolefin	1
<input type="checkbox"/>	L5	L4 and forming	923
<input type="checkbox"/>	L4	L3 and copper	1141
<input type="checkbox"/>	L3	L2 and wall	4961
<input type="checkbox"/>	L2	L1 and heating	7339
<input type="checkbox"/>	L1	chamber near10 cleaning	30085

END OF SEARCH HISTORY

## Hit List

Search Results - Record(s) 1 through 10 of 15 returned.

☐ 1. Document ID: US 20010020478 A1

Using default format because multiple data bases are involved.

L15: Entry 1 of 15

File: PGPB

Sep 13, 2001

PGPUB-DOCUMENT-NUMBER: 20010020478

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20010020478 A1

TITLE: Cleaning method of tratment equipment and treatment equipment

PUBLICATION-DATE: September 13, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Kojima, Yasuhiko	Nirasaki-shi		JP	
Oshima, Yasuhiro	Nirasaki-shi		JP	

US-CL-CURRENT: 134/3; 134/102.1, 134/21, 134/36, 134/37

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KMC	Draw D
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☐ 2. Document ID: US 20010009274 A1

L15: Entry 2 of 15

File: PGPB

Jul 26, 2001

PGPUB-DOCUMENT-NUMBER: 20010009274

PGPUB-FILING-TYPE: new

DOCUMENT-IDENTIFIER: US 20010009274 A1

TITLE: Substituted phenylethylene precursor synthesis method

PUBLICATION-DATE: July 26, 2001

INVENTOR-INFORMATION:

NAME	CITY	STATE	COUNTRY	RULE-47
Zhuang, Wei-Wei	Vancouver	WA	US	
Nguyen, Tue	Vancouver	WA	US	
Charneski, Lawrence J.	Vancouver	WA	US	
Evans, David R.	Beaverton	OR	US	
Hsu, Sheng Teng	Camas	WA	US	

h e b b g e e c f e b e f b e

US-CL-CURRENT: 252/519.2; 423/23

## ABSTRACT:

A Cu(hfac) precursor with a substituted phenylethylene ligand has been provided. The substituted phenylethylene ligand includes bonds to molecules selected from the group consisting of C.sub.1 to C.sub.6 alkyl, C.sub.1 to C.sub.6 haloalkyl, C.sub.1 to C.sub.6 phenyl, H and C.sub.1 to C.sub.6 alkoxy. One variation, the .alpha.-methylstyrene ligand precursor has proved to be stable a low temperatures, and sufficiently volatile at higher temperatures. Copper deposited with this precursor has low resistivity and high adhesive characteristics. A synthesis method has been provided which produces a high yield of the above-described precursor.

Full	Title	Citation	Front	Review	Classification	Date	Reference	Sequences	Attachments	Claims	KWIC	Draw	De
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☐ 3. Document ID: US 6669870 B2

L15: Entry 3 of 15

File: USPT

Dec 30, 2003

US-PAT-NO: 6669870

DOCUMENT-IDENTIFIER: US 6669870 B2

TITLE: Substituted phenylethylene precursor synthesis method

DATE-ISSUED: December 30, 2003

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zhuang; Wei-Wei	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		
Charneski; Lawrence J.	Vancouver	WA		
Evans; David R.	Beaverton	OR		
Hsu; Sheng Teng	Camas	WA		

US-CL-CURRENT: 252/519.2; 427/253

## ABSTRACT:

A Cu(hfac) precursor with a substituted phenylethylene ligand has been provided. The substituted phenylethylene ligand includes bonds to molecules selected from the group consisting of C.sub.1 to C.sub.6 alkyl, C.sub.1 to C.sub.6 haloalkyl, C.sub.1 to C.sub.6 phenyl, H and C.sub.1 to C.sub.6 alkoxy. One variation, the .alpha.-methylstyrene ligand precursor has proved to be stable a low temperatures, and sufficiently volatile at higher temperatures. Copper deposited with this precursor has low resistivity and high adhesive characteristics. A synthesis method has been provided which produces a high yield of the above-described precursor.

2 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

h e b b g e e e f e b e f b e

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 4. Document ID: US 6245261 B1

L15: Entry 4 of 15

File: USPT

Jun 12, 2001

US-PAT-NO: 6245261

DOCUMENT-IDENTIFIER: US 6245261 B1

TITLE: Substituted phenylethylene precursor and synthesis method

DATE-ISSUED: June 12, 2001

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zhuang; Wei-Wei	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		
Charneski; Lawrence J.	Vancouver	WA		
Evans; David R.	Beaverton	OR		
Hsu; Sheng Teng	Camas	WA		

US-CL-CURRENT: 252/519.2; 252/500, 427/250, 427/252, 427/253, 556/117

## ABSTRACT:

A Cub(hfac) precursor with a substituted phenylethylene ligand has been provided. The substituted phenylethylene ligand includes bonds to molecules selected from the group consisting of C.sub.1 to C.sub.6 alkyl, C.sub.1 to C.sub.6 haloalkyl, C.sub.1 to C.sub.6 phenyl, H and C.sub.1 to C.sub.6 alkoxyl. One variation, the .alpha.-methylstyrene ligand precursor has proved to be stable a low temperatures, and sufficiently volatile at higher temperatures. Copper deposited with this precursor has low resistivity and high adhesive characteristics. A synthesis method has been provided which produces a high yield of the above-described precursor.

6 Claims, 5 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 3

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 5. Document ID: US 6090963 A

L15: Entry 5 of 15

File: USPT

Jul 18, 2000

US-PAT-NO: 6090963

DOCUMENT-IDENTIFIER: US 6090963 A

TITLE: Alkene ligand precursor and synthesis method

DATE-ISSUED: July 18, 2000

h e b b g e e e f e b e f b e

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zhuang; Wei-Wei	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		
Barrowcliff; Robert	Vancouver	WA		
Evans; David Russell	Beaverton	OR		
Hsu; Sheng Teng	Camas	WA		

US-CL-CURRENT: 556/112; 427/248.1, 556/113, 556/117

## ABSTRACT:

A metal(hfac), alkene ligand precursor has been provided. The alkene ligand includes double bonded carbon atoms, with first and second bonds to the first carbon atom, and third and fourth bonds to the second carbon atom. The first, second, third, and fourth bonds are selected from a the group consisting of H, C.sub.1 to C.sub.8 alkyl, C.sub.1 to C.sub.8 haloalkyl, and C.sub.1 to C.sub.8 alkoxy. As a general class, these precursors are capable of high metal deposition rates and high volatility, despite being stable in the liquid phase at low temperatures. Copper deposited with this precursor has low resistivity and high adhesive characteristics. A synthesis method has been provided which produces a high yield of the above-described alkene ligand class of metal precursors.

26 Claims, 17 Drawing figures

Exemplary Claim Number: 1,2,3

Number of Drawing Sheets: 6

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMAC	Draw D
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☐ 6. Document ID: US 6090960 A

L15: Entry 6 of 15

File: USPT

Jul 18, 2000

US-PAT-NO: 6090960

DOCUMENT-IDENTIFIER: US 6090960 A

TITLE: Precursor with (methoxy) (methyl) silylolefin ligand to deposit copper and method same

DATE-ISSUED: July 18, 2000

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Senzaki; Yoshihide	Vancouver	WA		
Charneski; Lawrence J.	Vancouver	WA		
Kobayashi; Masato	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		

US-CL-CURRENT: 556/9; 106/1.26, 427/248.1, 427/250, 427/252, 556/10

## ABSTRACT:

h e b b g e e f e b ef b e

A method of applying chemical vapor deposition (CVD) copper (Cu) to integrated circuit substrates using a precursor with either a dimethoxymethylvinylsilane (dmomvs), or methoxydimethylvinylsilane (modmvs), silylolefin ligand bonded to (hfac)Cu is provided. The dmomvs ligand is able to provide the electrons of oxygen atoms from two methoxy groups to improve the bond between the ligand and the (hfac)Cu complex. The improved bond helps insure that the ligand separates from the (hfac)Cu complex at consistent temperatures when Cu is to be deposited. In situations where a precursor having a smaller molecular weight is desired, the modmvs ligand is used to provide electrons from the oxygen atom of the single methoxy group. In the preferred embodiment, water vapor is added to the volatile precursor to improve the conductivity of the deposited Cu. Other embodiments provide a precursor blend made from additional silylolefins, hexafluoroacetylacetone (H-hfac), and water, either separately, or in combinations, to enhance deposition rate, conductivity, and precursor stability. A Cu precursor compound including the dmomvs and modmvs ligands with (hfac)Cu is also provided.

30 Claims, 7 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KNOC	Draw. De
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☐ 7. Document ID: US 6015918 A

L15: Entry 7 of 15

File: USPT

Jan 18, 2000

US-PAT-NO: 6015918

DOCUMENT-IDENTIFIER: US 6015918 A

TITLE: Allyl-derived precursor and synthesis method

DATE-ISSUED: January 18, 2000

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zhuang; Wei-Wei	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		
Stecker; Greg Michael	Vancouver	WA		
Evans; David Russell	Beaverton	OR		
Hsu; Sheng Teng	Camas	WA		

US-CL-CURRENT: 556/117; 427/248.1, 427/587, 556/136

ABSTRACT:

A Cu(hfac) allyl-derived ligand precursor has been provided. The ligand includes group consisting of alkyl, phenyl, trialkylsilane, trialkoxylsilane, halodialkylsilane, dihaloalkylsilane, trihalosilane, triphenylsilane, alkoxyl, halogen, chloroformate, cyanide, cycloalkyl, cycloalkylamine, alkyl ether, isocyanate, and pentafluorobenzene. Examples of the allyl-derived ligand precursors have proved to be stable at room temperatures, and sufficiently volatile at higher temperatures. Copper deposited with this precursor has low resistivity and high

adhesive characteristics. A synthesis method has been provided which produces a high yield of the above-described precursors, including a Cu(hfac) (allyltrimethylsilane) precursor.

21 Claims, 6 Drawing figures  
Exemplary Claim Number: 1,5,10  
Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Drawn De
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☐ 8. Document ID: US 5994571 A

L15: Entry 8 of 15

File: USPT

Nov 30, 1999

US-PAT-NO: 5994571

DOCUMENT-IDENTIFIER: US 5994571 A

TITLE: Substituted ethylene precursor and synthesis method

DATE-ISSUED: November 30, 1999

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Zhuang; Wei-Wei	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		
Charneski; Lawrence J.	Vancouver	WA		
Evans; David Russell	Beaverton	OR		
Hsu; Sheng Teng	Camas	WA		

US-CL-CURRENT: 556/117; 427/587, 427/593, 556/136

ABSTRACT:

A Cu(hfac) precursor with a substituted ethylene ligand has been provided. The substituted ethylene ligand includes bonds to molecules selected from the group consisting of C.sub.1 to C.sub.8 alkyl, C.sub.1 to C.sub.8 haloalkyl, H, and C.sub.1 to C.sub.8 alkoxy. One variation, the 2-methyl-1-butene ligand precursor has proved to be stable at room temperature, and extremely volatile at higher temperatures. Copper deposited with this precursor has low resistivity and high adhesive characteristics. Because of the volatility, the deposition rate of copper deposited with this precursor is very high. A synthesis method has been provided which produces a high yield of the above-described precursor.

19 Claims, 4 Drawing figures  
Exemplary Claim Number: 1,2,10  
Number of Drawing Sheets: 2

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Drawn De
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☐ 9. Document ID: US 5767301 A

h e b b g e e f e b e f b e

L15: Entry 9 of 15

File: USPT

Jun 16, 1998

US-PAT-NO: 5767301

DOCUMENT-IDENTIFIER: US 5767301 A

TITLE: Precursor with (alkyloxy)(alkyl)-silylolefin ligand to deposit copper

DATE-ISSUED: June 16, 1998

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Senzaki; Yoshihide	Vancouver	WA		
Kobayashi; Masato	Vancouver	WA		
Charneski; Lawrence J.	Vancouver	WA		
Nguyen; Tue	Vancouver	WA		

US-CL-CURRENT: 556/9; 117/104, 427/587, 556/117, 556/12

## ABSTRACT:

A method is provided for applying chemical vapor deposition (CVD) copper (Cu) to integrated circuit substrates using a Cu(hfac)(ligand) precursor with a silylolefin ligand including combinations of C1-C8 alkyl groups with at least one C2-C8 alkyloxy group. The alkyloxy groups include, ethoxy, propoxy, butoxy, pentyloxy, hexyloxy, heptyloxy, octyloxy, and aryloxy, while the alkyl groups include methyl, ethyl, propyl, butyl, pentyl, hexyl, heptyl, octyl, and aryl. The oxygen atoms of the alkyloxy groups, and the long carbon chains of both the alkyl and alkyloxy groups, increase the stability of the precursor by contributing electrons to the Cu (hfac) complex. The improved bond helps insure that the ligand separates from the (hfac)Cu complex at consistent temperatures when Cu is to be deposited. Combinations of alkyloxy and alkyl groups allow the molecular weight of the precursor to be manipulated so that the volatility of the precursor is adjustable for specific process scenarios. Other embodiments provide a precursor blend made from additional silylolefins, hexafluoroacetylacetone (H-hfac), H-hfac dihydrate, and water, either separately, or in combinations, to enhance deposition rate, conductivity, and precursor stability. A Cu precursor compound including silylolefin ligands having at least one alkyloxy group is also provided. Combinations of ethyl groups with ethoxy groups are specifically disclosed.

29 Claims, 13 Drawing figures

Exemplary Claim Number: 1,5,18

Number of Drawing Sheets: 4

Full	Title	Citation	Front	Review	Classification	Date	Reference	Claims	Know	Draw
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☐ 10. Document ID: US 5273775 A

L15: Entry 10 of 15

File: USPT

Dec 28, 1993

US-PAT-NO: 5273775

DOCUMENT-IDENTIFIER: US 5273775 A

TITLE: Process for selectively depositing copper aluminum alloy onto a substrate

h e b b g e e e f e b e f b e



DATE-ISSUED: December 28, 1993

## INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Dyer; Paul N.	Allentown	PA		
Fine; Stephen M.	Emmaus	PA		
Norman; John A. T.	Encinitas	CA		

US-CL-CURRENT: 438/656; 216/51, 257/E21.171, 257/E21.295, 427/252, 427/253,  
427/255.19, 427/255.7, 427/96.8, 427/97.2, 427/97.4, 438/661, 438/677, 438/680,  
438/687

## ABSTRACT:

An improved method is provided for depositing a thin copper aluminum alloy film on a patterned silicon substrate. A copper base layer conforming to the existing pattern is initially formed on the surface of the substrate, followed by contact with vapors of an aminealane compound, which causes aluminum to be selectively deposited on the copper base layer portion of the substrate. Preferably, copper is applied to a diffusion barrier surface such as tungsten using chemical vapor deposition from a complex of copper (I) perfluoroalkyl-.beta.-diketonate and an olefin or silylolefin. The entire process of developing an alloy film can be carried out without exceeding 200.degree. C.

27 Claims, 2 Drawing figures

Exemplary Claim Number: 1

Number of Drawing Sheets: 2

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWAC	Draw. De
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Clear	Generate Collection	Print	Fwd Refs	Bkwd Refs	Generate OACS
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Term	Documents
COMPLEX	893108
COMPLEXES	154772
(10 AND COMPLEX).PGPB,USPT,EPAB,JPAB,DWPI,TDBD.	15
(L10 AND COMPLEX).PGPB,USPT,EPAB,JPAB,DWPI,TDBD.	15

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[Previous Page](#)[Next Page](#)[Go to Doc#](#)

## Hit List

Clear	Generate Collection	Print	Fwd Refs	Bkwd Refs
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Search Results - Record(s) 11 through 15 of 15 returned.

☐ 11. Document ID: US 5085731 A

Using default format because multiple data bases are involved.

L15: Entry 11 of 15

File: USPT

Feb 4, 1992

US-PAT-NO: 5085731

DOCUMENT-IDENTIFIER: US 5085731 A

**\*\* See image for Certificate of Correction \*\***

TITLE: Volatile liquid precursors for the chemical vapor deposition of copper

DATE-ISSUED: February 4, 1992

INVENTOR-INFORMATION:

NAME	CITY	STATE	ZIP CODE	COUNTRY
Norman; John A. T.	Whitehall	PA		
Muratore; Beth A.	Elverson	PA		

US-CL-CURRENT: 216/105; 216/13, 427/250, 427/252, 427/253

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw D
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☐ 12. Document ID: JP 10204640 A

L15: Entry 12 of 15

File: JPAB

Aug 4, 1998

PUB-NO: JP410204640A

DOCUMENT-IDENTIFIER: JP 10204640 A

TITLE: COPPER PRECURSOR COMPOUND AND METHOD FOR APPLYING CHEMICAL VAPOR GROWN COPPER TO SELECTED SURFACE

PUBN-DATE: August 4, 1998

INVENTOR-INFORMATION:

NAME	COUNTRY
SENZAKI, YOSHIHIDE	

INT-CL (IPC): C23 C 16/18; H01 L 21/285

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KMC	Draw D
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☐ 13. Document ID: EP 987346 A1

L15: Entry 13 of 15

File: EPAB

Mar 22, 2000

PUB-NO: EP000987346A1

DOCUMENT-IDENTIFIER: EP 987346 A1

TITLE: Copper deposition method using a precursor with (alkyloxy) (alkyl) silylolefin ligands

PUBN-DATE: March 22, 2000

## INVENTOR-INFORMATION:

NAME

SENZAKI, YOSHIHIDE

KOBAYASHI, MASATO

CHARNESKI, LAWRENCE J

NGUYEN, TUE

COUNTRY

US

JP

US

US

INT-CL (IPC): C23 C 16/18; C07 F 7/18

EUR-CL (EPC): C23C016/18

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 14. Document ID: EP 855399 A2

L15: Entry 14 of 15

File: EPAB

Jul 29, 1998

PUB-NO: EP000855399A2

DOCUMENT-IDENTIFIER: EP 855399 A2

TITLE: Precursor with alkylaminosilylolefin ligands to deposit copper and method for same

PUBN-DATE: July 29, 1998

## INVENTOR-INFORMATION:

NAME

SENZAKI, YOSHIHIDE

COUNTRY

US

INT-CL (IPC): C07 F 7/18; C23 C 16/18

EUR-CL (EPC): C07F007/08; C07F007/18, C07F007/18 , C07F007/18 , C23C016/18

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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☐ 15. Document ID: EP 852229 A2

L15: Entry 15 of 15

File: EPAB

Jul 8, 1998

PUB-NO: EP000852229A2

DOCUMENT-IDENTIFIER: EP 852229 A2

TITLE: Precursor with (methoxy) (methyl) silylolefin ligands to deposit copper and

method for the same

PUBN-DATE: July 8, 1998

INVENTOR-INFORMATION:

NAME	COUNTRY
SENZAKI, YOSHIHIDE	US
CHARNESKI, LAWRENCE JOEL	US
KOBAYASHI, MASATO	US
NGUYEN, TUE	US

INT-CL (IPC): C07 F 7/18; C23 C 16/18

EUR-CL (EPC): C07F007/18; C23C016/18

Full	Title	Citation	Front	Review	Classification	Date	Reference			Claims	KWIC	Draw D
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Term	Documents
COMPLEX	893108
COMPLEXES	154772
(10 AND COMPLEX).PGPB,USPT,EPAB,JPAB,DWPI,TDBD.	15
(L10 AND COMPLEX).PGPB,USPT,EPAB,JPAB,DWPI,TDBD.	15

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[Previous Page](#)

[Next Page](#)

[Go to Doc#](#)

[First Hit](#)[Previous Doc](#)[Next Doc](#)[Go to Doc#](#)

Generate Collection

Print

L15: Entry 12 of 15

File: JPAB

Aug 4, 1998

DOCUMENT-IDENTIFIER: JP 10204640 A

TITLE: COPPER PRECURSOR COMPOUND AND METHOD FOR APPLYING CHEMICAL VAPOR GROWN  
COPPER TO SELECTED SURFACEAbstract Text (1):

PROBLEM TO BE SOLVED: To make it possible to increase the deposition rate of Cu, electrical conductivity and temp. stability by incorporating Cu+1 (hexafluoroacetyl acetate) and silylolefin ligand contg. the alkylamino group bonded to a silicon atom into a volatile Cu precursor compd. for chemical vapor growth of copper.

Abstract Text (2):

SOLUTION: When the Cu precursor compd. is heated to an evaporation temp., the nitrogen in the alkylamino silylolefin ligand donates electrons to stably bond the Cu and the ligand. The ligand fissures at a specified temp. and the Cu precursor compd. decomposes at a specified temp., thereby enabling the lowering of the decomposition temp. When the molecular complex bonded to the silicon atom is changed, the vapor pressure, electron donative ability, mol.wt. and symmetry of the molecules of the Cu precursor compd. in the gaseous phase change. The Cu precursor compd. may be maintained in the stable state in a wide temp. range and the shelf life thereof is prolonged.

[Previous Doc](#)[Next Doc](#)[Go to Doc#](#)